

ART. XVIII.—*Spirochaetae in Lesions affecting the Pig.*

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The presence of these protozoan parasites has been already described in certain pathological conditions of the pig, notably by Dodd, as occurring in an ulcerative skin disease in the Transvaal, transmissible both by contagion and by inoculation,¹ and by Cleland in "Castration tumours" of the pig in West Australia.² Recently the occurrence of spirochaetes has been observed by me in several lesions of somewhat diverse character in Victorian pigs, of which the following is a short description.

SKIN AND SUBCUTANEOUS LESIONS.

In January, 1910, a pig's head was received from the Veterinary Department of the Victorian Government. It was affected with a large ulcerating tumour the size of a fist on the side of the cheek. The tumour was dense, and had the characteristics of a fibroma. Unfortunately, no preservative having been used, putrefaction was somewhat advanced. Microscopical examination showed throughout the structure of the tumour numerous spirochaetes, the majority similar in size to those found in the fowl, but a number were much shorter than those usually found in avian blood.

As the owner stated that he had previously had three pigs similarly affected and still had one showing a similar condition, Dr. Cameron requested him to forward it alive. It was duly sent, but unfortunately arrived during my absence on a holiday. On arrival it was observed to be suffering from a hard swelling on the side of the left jaw, and a healthy young pig was placed in the same pen to test the possibility of contagion.

On my return to Melbourne it was found that the swelling on the left jaw had disappeared, but that the left knee was swollen,

1 Jour. Comp. Path., 1906.

2 Parasitology, vol. 1., No. 3).

and showed a small ulcerating surface just under the joint. Below this swelling was a caseous and necrotic area, extending downwards about two inches, and surrounded with chronic inflammatory tissue. Smears from this showed numerous spirochaetes and a mixed bacterial flora.

Attempts to transfer the condition by inoculation on scarified skin resulted in a number of granulomatous, inflammatory, chancroid lesions being slowly developed at and in the vicinity of the scarified area. These ultimately disappeared, but at no time were spirochaetes detected, although microscopical examinations were frequently made: the granulomatous tissue appeared to be due simply to streptococci, which were present in large numbers.

The contact pig remained normal.

Recently I have had an opportunity of examining two cases of scrotal tumours similar to those described by Dr. Cleland, through the courtesy of Mr. John Robertson, Director of the City Abattoir. Both pigs were in fat condition, about 18 months old, and I was informed the viscera of each were normal. At first glance the tumours had almost the appearance of normal testicles somewhat enlarged, being very prominently situated in the scrotal region subcutaneously. The skin was normal, but for the scar where the wounds by the castration knife had been made. In one case a tumour was situated in each scrotal sac, but in the other only one was present. On dissection the tumours, which were ovoid, slightly flattened and of the diameter of a large orange, were found to be circumscribed and fairly dense in consistency. On section the new growths were seen to be composed of fibrous but oedematous, new connective tissue, enclosing a central, irregular, necrotic, caseous area almost the size of a walnut, immediately around which the fibrous tissue was distinctly of a greyish dirty colour, strongly contrasting with the translucent homogeneous appearance of the peripheral mass.

In each case the spermatic cords, at the distal end of which the tumours proper were situated, were thickened, being about an inch in diameter, and contained several circumscribed caseous areas varying from the size of a marble to that of a walnut.

Microscopical examination of smears of the central degenerated material from the terminal tumours showed many spirochaetes similar to those already described, along with masses of various kinds of micro-organisms, such as cocci, long and short bacilli. Scrapings from the oedematous fibrous tissue showed also many spirochaetes with numbers of bacteria though few in comparison with those present in the caseous centre. The caseous nodules in the thickened cord, while containing many mixed bacteria, appeared to be free of spirochaetes.

As to whether the spirochaetes were the cause of the new fibrous growths under consideration is a question that requires further investigation, but the indications at least are that their presence conduces to the formation of the new fibrous issue observed, while the central degeneration is probably the result of the bacterial invasion.

SUB-MUCOUS CYSTS OF LARGE INTESTINE.

Spirochaetes have been found by me recently associated with intestinal lesions of the pig, but apparently they were not the cause of any serious general disturbance.

The lesions were first observed in two young pigs received alive from the country for examination. The animals on arrival were very lean, and though the temperatures were above normal the appetite was good. The blood of each was normal so far as erythrocytes were concerned (7,500,000 to 8,000,000), but there was a definite increase in leucocytes (50,000) chiefly eosinophiles.

During the succeeding three days, as the condition was rapidly improving and no definite symptoms could be detected beyond a slight fluctuation in the temperature, one was slaughtered for examination, and the other a week later, when it was obvious a very decided improvement in appearance had taken place, these facts alone pointing to some neglect or dietetic error having been the cause of the poor condition.

The first pig killed showed a definite pathological condition of the large intestine. The mucosa of the caecum was affected for an area of about eight inches with patches of inflammation covered by diphtheritic false membrane. The large intestine

throughout its whole course showed numerous circular, flattened, greyish nodules, each about the size of a small pea, there being about 2 to 4 present to the square inch. These nodules were distinctly observable without incising the bowel, and caused some projection of the serous covering. On examination of the mucous surface slight circular elevations were observed corresponding to these nodules, the majority showing a minute central depression, through which the contents could be readily squeezed. These nodules were apparently cystic in nature; in some instances the contents appeared translucent, jelly-like and not readily broken down, with a small greyish caseous centre, in others the contents were completely caseous.

On microscopical examination the material was seen to consist chiefly of fibrinous debris with pus cells and some columnar epithelia. A peculiar feature of the less degenerated contents was the presence in smears of a finely laminated membranous structure as if part of a parasitic cyst wall. Stained by Giemsa's method myriads of beaded bacteria of varying length, cocci and bacilli could be detected, but, in addition, especially in the "laminated" membrane, could be seen many delicate spiral organisms with all the characters of spirochaetae. These were so regular and so numerous in the "laminated" structure, which was comparatively free of bacteria, that there seemed to be some decided connection. It should be observed that in the fresh state no definite movement of the spirochaetes could be observed, and that there were always some actively motile cercomonas found present.

Sections of the intestinal wall demonstrate these nodules to be of the nature of small cysts of the deeper glands, external to the muscularis mucosae and apparently all these glands are more or less affected. Considerable irritation is evidenced by the accumulation of lymphocytes and some formation of new fibrous tissue with atrophy of the muscular wall, at the periphery, while the centre is composed of fibrinous material with shed epithelial cells and more or less degenerated polymorphs. Masses of bacteria, chiefly bacilli, showing great irregularity in staining, can be seen present amongst the cells and debris.

It may be noted that a young pig about six weeks old which was placed in the same pen as these pigs developed a high tem-

perature with capricious appetite, ten days later, and was killed on the fourteenth day as it was evidently recovering from this condition. Post-mortem examination disclosed a bronchopneumonia with irregular areas of degeneration (caseous) which was evidently the cause of the indisposition. In addition, however, on examination of the mucous membrane of the large intestine a number of nodules similar but smaller in size to those above described were observed. They were not visible on the serous surface and none were degenerated; all showed the central depression, and contained a gelatinous material, amongst which bacteria as before, and a few cercomonas could be demonstrated, but no spirochaetae.

That these nodules were not induced by contagion from the previous cases was proved by the fact that a control from the same litter which had remained in good health, killed ten days later, was also affected with similar nodules. These again contained no spirochaetes, but many bacilli and a few cercomonas.

It may be assumed therefore that whatever may be the pathological significance (obviously not great) of these nodules or cysts, which were probably due to the bacterial invasion, the presence of spirochaetes within their contents was probably accidental.

In neither of the first two pigs were any metazoan parasites observed though careful search was made throughout the whole of the intestinal tract. It may therefore be concluded that the definite eosinophilia present in each was probably due to the spirochaete invasion of the intestinal cysts described.
